CLAIMS

1. Apparatus for transferring information within a cellular network, comprising:

a base-station transceiver system (BTS) positioned at a first location, which comprises:

communication control circuitry, adapted to generate down-link radio-frequency (RF) signals receivable by a mobile cellular transceiver operative within the cellular network and to process up-link RF signals transmitted by the mobile cellular transceiver; and

first transducer circuitry, adapted to modulate a first beam of unguided electromagnetic radiation with the down-link RF signals and to radiate the modulated beam as a first modulated beam, and to receive and demodulate a second modulated beam of unguided electromagnetic radiation so as to recover the up-link RF signals; and

an antenna assembly, positioned at a second location remote from the first location, which comprises:

second transducer circuitry, adapted to modulate a second beam of unguided electromagnetic radiation with the up-link RF signals and to radiate the modulated beam as the second modulated beam to the BTS, and to receive and demodulate the first modulated beam of unguided electromagnetic radiation from the BTS so as to recover the down-link RF signals; and

an antenna, adapted to radiate the recovered down-link RF signals to the mobile cellular transceiver and to receive the up-link RF signals from the mobile cellular transceiver.

2. Apparatus according to claim 1, wherein the first and the second transducer circuitry are adapted to

radiate the first modulated beam and the second modulated beam via a path between the BTS and the antenna comprising free space.

3. Apparatus according to claim 1, wherein at least one of the first and second transducer circuitry comprises a laser which transmits coherent radiation as the unguided electromagnetic radiation between the BTS and the antenna.

4. Apparatus according to claim 1, wherein at least one of the first and second transducer circuitry comprises at least one emitter which transmits incoherent radiation as the unguided electromagnetic radiation between the BTS and the antenna.

5. Apparatus according to claim 1, wherein the first location is separated from the second location by a distance chosen from a range between approximately 10 m and approximately 700 m.

6. Apparatus according to claim 1, wherein at least one of the first and second beams comprises electromagnetic radiation having a wavelength chosen from a range between approximately 0.3 μm and approximately 30 μm.

7. Apparatus according to claim 1, wherein at least one of the first and second beams comprises electromagnetic radiation having a wavelength chosen from a range between approximately 1 mm and approximately 30 cm.

8. Apparatus according to claim 1, and comprising a switching center which is adapted to generate the information responsive to the up-link and down-link signals and to transfer the information between the BTS and at least one communication system chosen from a group comprising a public switched telephone network (PSTN), a distributed packet transfer network, a satellite

communications system, and a second cellular network.

9. Apparatus according to claim 1, and comprising a base-station controller (BSC) which controls the BTS.

10. Apparatus according to claim 1, wherein at least one of the down-link RF signals and the up-link RF signals comprise a plurality of separate RF signals.

11. Apparatus according to claim 1, wherein the first transducer circuitry comprises an analog-to-digital converter which is adapted to digitize the down-link RF signals so as to generate down-link digitized signals, and wherein the second transducer circuitry comprises a digital-to-analog converter which is adapted to recover the down-link RF signals from the down-link digitized signals.

12. Apparatus according to claim 11, wherein the first transducer circuitry is adapted to compress the down-link digitized signals so as to generate compressed down-link digital signals, and wherein the second transducer circuitry is adapted to decompress the compressed down-link digital signals so as to recover the down-link digitized signals.

13. Apparatus according to claim 1, wherein the second transducer circuitry comprises an analog-to-digital converter which is adapted to digitize the up-link RF signals so as to generate up-link digitized signals, and wherein the first transducer circuitry comprises a digital-to-analog converter which is adapted to recover the up-link RF signals from the up-link digitized signals.

14. Apparatus according to claim 13, wherein the second transducer circuitry is adapted to compress the up-link digitized signals so as to generate compressed up-link

digital signals, and wherein the second transducer circuitry is adapted to decompress the compressed up-link digital signals so as to recover the up-link digitized signals.

15. A method for transferring information within a cellular network, comprising:

positioning a base-station transceiver system (BTS) at a first location;

generating in communication control circuitry comprised in the BTS down-link radio-frequency (RF) signals receivable by a mobile cellular transceiver operative within the cellular network;

modulating a first beam of unguided electromagnetic radiation with the down-link RF signals in first transducer circuitry comprised in the BTS, so as to form a first modulated beam;

radiating the first modulated beam from the first transducer circuitry;

receiving and demodulating a second modulated beam of unguided electromagnetic radiation in the first transducer circuitry so as to recover up-link RF signals transmitted by the mobile cellular transceiver;

processing the up-link RF signals in the communication control circuitry;

positioning an antenna assembly at a second location remote from the first location;

receiving in an antenna comprised in the antenna assembly the up-link signals from the mobile cellular transceiver;

modulating a second beam of unguided electromagnetic radiation with the up-link RF signals in second transducer circuitry comprised in the antenna assembly, so as to form the second modulated beam ;

radiating the second modulated beam from the second

transducer circuitry to the BTS;

receiving and demodulating in the second transducer circuitry the first modulated beam from the first transducer circuitry so as to recover the down-link RF signals; and

radiating the recovered down-link RF signals from the antenna to the mobile cellular transceiver.

16. A method according to claim 15, wherein radiating the first modulated beam and radiating the second modulated beam comprises radiating the beams via a path between the BTS and the antenna comprising free space.

17. A method according to claim 15, and comprising providing at least one laser which transmits coherent radiation as the unguided electromagnetic radiation between the BTS and the antenna.

18. A method according to claim 15, and comprising providing at least one emitter which transmits incoherent radiation as the unguided electromagnetic radiation between the BTS and the antenna.

19. A method according to claim 15, wherein the first location is separated from the second location by a distance chosen from a range between approximately 10 m and approximately 700 m.

20. A method according to claim 15, wherein at least one of the first and second beams comprises electromagnetic radiation having a wavelength chosen from a range between approximately 0.3 μm and approximately 30 μm.

21. A method according to claim 15, wherein at least one of the first and second beams comprises electromagnetic radiation having a wavelength chosen from a range between approximately 1 mm and approximately 30 cm.

22. A method according to claim 15, and comprising a

generating the information responsive to the up-link and down-link signals and transferring the information between the BTS and at least one communication system chosen from a group comprising a public switched telephone network (PSTN), a distributed packet transfer network, a satellite communications system, and a second cellular network.

23. A method according to claim 15, and comprising controlling the BTS with a base-station controller (BSC).

24. A method according to claim 15, wherein at least one of the down-link RF signals and the up-link RF signals comprise a plurality of separate RF signals.

25. A method according to claim 15, and comprising:

digitizing the down-link RF signals in an analog-to-digital converter comprised in the first transducer circuitry so as to generate down-link digitized signals, and

recovering the down-link RF signals from the down-link digitized signals in a digital-to-analog converter comprised in the second transducer circuitry.

26. A method according to claim 25, and comprising:

compressing the down-link digitized signals in the first transducer circuitry so as to generate compressed down-link digital signals; and

decompressing the compressed down-link digital signals in the second transducer circuitry so as to recover the down-link digitized signals.

27. A method according to claim 15, and comprising:

digitizing the up-link RF signals in an analog-to-digital converter comprised in the second transducer circuitry so as to generate up-link digitized signals, and

recovering the up-link RF signals from the up-link

digitized signals in a digital-to-analog converter comprised in the first transducer circuitry.

28. A method according to claim 27, and comprising:

compressing the up-link digitized signals in the second transducer circuitry so as to generate compressed up-link digital signals; and

decompressing the compressed up-link digital signals in the first transducer circuitry so as to recover the up-link digitized signals.